

Design & Drafting Technology

Levels: Grades 10-12
Units of Credit: Minimum 0.5 credit
CIP Code: 15.1301
Prerequisite: None

COURSE DESCRIPTION

Students will use technical knowledge and skills to plan and prepare scale pictorial interpretations of engineering and design concepts. Includes instruction in the use of precision drawing instruments, sketching, drawing layout, geometric construction, and dimensioning.

CORE STANDARDS, OBJECTIVES, AND INDICATORS

STANDARD **Students will be able to understand professional drafting room procedures and safe practices.**
151301-01

OBJECTIVES

151301-0101 Pass the safety test with a score of 100 percent.
151301-0102 Understand the introduction to drafting and how it relates occupations and opportunities.
151301-0103 Demonstrate safe drafting practices.
151301-0104 Display a professional attitude toward the supervisor and colleagues.
151301-0105 Follow the institution's attendance policies.

STANDARD **Students will be able to use drafting machine and tools**
151301-02

OBJECTIVES

151301-0201 Demonstrate the correct operation and maintenance of drafting machines.
151301-0202 Identify and demonstrate the use of a compass, French curve, circle template, etc., to draw circles and arcs.
151301-0203 Identify and demonstrate the use of other drafting tools and equipment in producing a drawing.

STANDARD **The student will be able to understand and demonstrate sketching techniques.**
151301-03

OBJECTIVES

151301-0301 Demonstrate the use of horizontal, vertical, and inclined lines.
151301-0302 Demonstrate the use of arcs and circles as they are drawn to proportionate radius or diameter.
151301-0302 Demonstrate the use of lines as they are drawn according to the alphabet of lines.
151301-0304 Develop sketches with paper, pencil, and an eraser without the use of straight edges or templates.
151301-0305 Demonstrate how to keep a drawing neat, clean, and smudge-free.

151301-0306 Produce a one-view sketch of an object using proportional relationships.
related academic: (m4.2, m6, m8.9)

STANDARD
151301-04 **The student will be able to understand and demonstrate the use of vertical, upper case, and gothic lettering.**

OBJECTIVES

151301-0401 Demonstrate previous standards and objectives by completing an accurate drawing.
151301-0402 Use guidelines that are spaced in accordance with the information sheet.
151301-0403 Use guidelines that are barely visible at arm's length.
151301-0404 Use letters and numerals that are fitted to the guidelines.
151301-0405 Use letters and numerals that conform to the gothic style.
151301-0406 Demonstrate how words and letters are to be evenly spaced.
151301-0407 Demonstrate how letters should be dark enough to produce sharp, crisp, and clear reproductions.
151301-0408 Produce lettering that is clean and smudge-free.
related academic: (c1, c7)

STANDARD
151301-05 **The student will be able to understand and demonstrate drawing layouts.**

OBJECTIVES

151301-0501 Demonstrate previous standards and objectives by completing an accurate drawing.
151301-0502 Produce a drawing that is clean and smudge-free.
151301-0503 Show how to center a drawing in the work area.
151301-0504 Understand how to complete a title block to a specified format.
related academic: (c7, m8.9)

STANDARD
151301-06 **The student will be able to understand and demonstrate how to complete a drawing using the alphabet of lines.**

OBJECTIVES

151301-0601 Demonstrate previous standards and objectives by completing an accurate drawing.
151301-0602 Understand and demonstrate the recommended thickness of lines.
151301-0603 Understand and demonstrate the correct use of line types.
151301-0604 Demonstrate all lines are in conformity with standard requirements.

- Understand and demonstrate the use of hidden lines.
- Understand and demonstrate the use of center lines cross without voids.
- Understand and demonstrate proper placement of dimensions on the dimension line.
- Understand and demonstrate proper spacing between the object and the extension line.
- Understand and demonstrate proper length of extension lines as they extend

- past the last arrowhead.
 - Understand and demonstrate the minimum distance used between the object and the first dimension line.
 - Understand and demonstrate the uniform spacing between dimension lines.
- 151301-0605 Demonstrate the correct use of leader lines.
- Understand and demonstrate leaders.
 - Understand and demonstrate the proper use of leaders in relation to placement with dimension lines.
 - Understand and demonstrate leaders in relation to arcs and circles.
 - Understand and demonstrate proper ending of leaders.
- related academic: (m8.9)

STANDARD **The student will be able to develop drawings to specified scales.**
151301-07

OBJECTIVES

- 151301-0701 Demonstrate previous standards and objectives by completing an accurate drawing.
- 151301-0702 Understand and demonstrate measuring with full graduations using full-scale.
- 151301-0703 Understand and demonstrate measuring with full graduations using half-scale.
- 151301-0704 Understand and demonstrate measuring with full graduations using quarter-scale.
related academic: (m1, m7.1, m7.4, m13)

STANDARD **The student will be able to understand how to reproduce a drawing.**
151301-08

OBJECTIVES

- 151301-0801 The drawing accurately demonstrates previous competency standards.
- 151301-0802 A reproduced copy has good contrast.
- 151301-0803 A reproduced copy has dark line density.
related academic: (m1)

STANDARD **The student will be able to produce geometric shapes such as straight lines, geometric angles, plane figures, circles and arcs, and irregular geometric figures.**
151301-09

OBJECTIVES

- 151301-0901 The drawing accurately demonstrates previous competency standards.
- 151301-0902 Construction lines are barely visible at arm's length.
- 151301-0903 Drawing lines show the accurate use of the tools.
- 151301-0904 Configuration corners are sharp.
- 151301-0905 Configuration tangents are smooth.
- 151301-0906 Configuration solutions are labeled correctly.
- 151301-0907 Configuration solution shows construction procedure.
- 151301-0908 Configuration elements are measured accurately.
- 151301-0909 Demonstrate knowledge of geometric shapes.

related academic: (m4.4, m8.9)

STANDARD **The student will be able to develop a complete multi-view drawing.**
151301-10

OBJECTIVES

151301-1001 The drawing accurately demonstrates previous competency standards.
151301-1002 Projection is in the third angle.
151301-1003 The top, front, and right side views are used unless otherwise required.
151301-1004 All views are aligned.
151301-1005 Appropriate lines and planes are located on each view.
151301-1006 All lines are used in accordance with standard procedures.
151301-1007 All fillets, rounds, and runouts are shown correctly.
151301-1008 Forty-five (45)-degree angle projection lines are used when required.
related academic: (m4.4, m8.9)

STANDARD **The student will be able to apply standard dimensioning practices to a**
151301-11 **drawing.**

OBJECTIVES

151301-1101 The drawing accurately demonstrates previous competency standards.
151301-1102 Understand dimensioning systems.
151301-1103 Demonstrate dimensioning rules.
151301-1104 Understand dimensioning fundamentals.
151301-1105 Demonstrate size and location dimensioning.
151301-1106 Understand the preferred dimensioning practices.
151301-1107 Demonstrate the use of notes for size features.
151301-1108 Understand and demonstrate tolerance dimensioning.
151301-1109 Understand the placement and use of general notes.
related academic: (m1, m7.1, m7.4, m13, c1, c7, s2, s3, s8, s11, c10, c20, c21)

PROFESSIONAL DEVELOPMENT

STANDARD **The student will understand the need for professional development.**
151301-12

OBJECTIVES

151301-1201 Complete a personal inventory.
151301-1202 Set and meet goals.
151301-1203 Be self-motivated.
151301-1204 Know how to make decisions.
151301-1205 Know how to manage time.
151301-1206 Organize personal belongings and lab equipment.
151301-1207 Learn to communicate verbally.
151301-1208 Write effective communications.
151301-1209 Establish a personal reading program.
151301-1210 Develop effective work skills and attitudes.

- 151301-1211* Master a working knowledge of SkillsUSA.
- State the SkillsUSA motto.
 - State the SkillsUSA creed.
 - Learn the SkillsUSA colors.
 - Describe the official SkillsUSA dress.
 - Describe the procedure for becoming a SkillsUSA officer.

STANDARD **The student will understand the need for leadership skills.**
151301-13

OBJECTIVES

- 151301-1301 Serve on a committee.
151301-1302 Prepare an agenda.
151301-1303 Assist in planning a meeting.
151301-1304 Review basic parliamentary procedure.
 - Make a main motion.
151301-1305 Participate in a school project.
151301-1306 Attend a community meeting.
151301-1307 Practice effective speaking.
151301-1308 Present a three- to five-minute talk.
151301-1309 Implement a leadership project.
151301-1310* Master a working knowledge of SkillsUSA.
 - Describe the meaning of the SkillsUSA emblem.
 - State the SkillsUSA pledge.
 - Describe the duties of a SkillsUSA officer.

STANDARD **The student will understand the need for career planning.**
151301-14

OBJECTIVES

- 151301-1401 Define your future occupation.
151301-1402 Survey employment opportunities.
151301-1403 Report on a trade journal article.
151301-1404 Explore opportunities for advanced training.
151301-1405 Conduct a worker interview.
151301-1406 Contact a professional association.
151301-1407 Explore entrepreneurship opportunities.
151301-1408 Give a talk about your career.
151301-1409 Review career goals.

*SkillsUSA PDP requirements - optional but recommended